METHOD OF FORMING A RECONSTITUTED COMPOSITION CONTAINING PROTEIN AND CARBOHYDRATE AT ELEVATED TOTAL SOLIDS CONTENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to reconstituting compositions containing carbohydrates and proteins. Specifically, the invention is directed to reconstituting protein- and carbohydrate-containing compositions at a higher non-fat solids content than has heretofore been practiced in the art.

2. Description of Related Art

It is known to reconstitute milk products from powdered milk products. Generally, reconstituted milk, like milk itself, contains about 12% solids. In the confectionary field, it is also known that certain products require liquid mixtures of carbohydrates and proteins. Non-limiting examples of products requiring such mixtures include: caramel, texturized caramel, and dulce de leche, all of which require a mixture comprising at least milk and sucrose. Liquid mixtures of carbohydrate and proteins are sometimes also used in chocolate making. Generally, these mixtures are provided premixed, for example as sweetened condensed milk.

The functionality required of these carbohydrate- and protein-containing compositions has become very demanding. The consumer demands a smooth, non-grainy texture in a caramel. Improperly hydrated protein can cause a grainy texture in a caramel product. Likewise, proteins that are too denatured can cause graininess in a finished confection.

According to one prior art method of reconstituting a protein and carbohydrate-containing composition, skim milk powder is reconstituted at about 43% total solids. Sugar and fat are then added to obtain a sweetened reconstituted milk having a solids content around 72%, the sweetened reconstituted milk is then evaporated to yield a composition having a total solids content of around 74%. A. J. Baldwin, et al., "The Dispersibility of Skim Milk Powder at High Total Solids," *New Zealand Journal of Dairy Science and Technology*, Vol. 9, No. 4 (1974) describes factors affecting the dispersibility of milk powder within the context of the above-described process. The resulting composition has significant amounts of fat. Fat does not require water for hydration (like milk powder), or to dissolve (like sugar). Thus, it is relatively easier to make a composition having a solids content in the range of 72% if a significant portion of the solids comes from fat.

U.S. Pat. No. 3,816,427 discloses an apparatus for continuously dissolving pulverulent material in a liquid. The patent discloses an example in which milk powder and sugar are dissolved simultaneously to obtain sweetened condensed milk purportedly having 72.68% "dry matter" content. The disclosed apparatus is specialized, and apparently requires excessive solids handling. Moreover, at least about 7.09% of the composition is added fat. The non-fat solids content of the compositions disclosed is less than about 66%.

SUMMARY OF THE INVENTION

This invention is directed to a method of forming a reconstituted high-solids composition containing carbohydrate and protein. The method comprises the steps of providing a liquid carbohydrate composition, most preferably a mixture of sucrose and water, having a solids content greater than about 55% by weight of the liquid carbohydrate composition, adjusting the temperature of said liquid carbohydrate composition to between about 45° C. and about 75° C., and mixing a powdered proteinaceous composition and the liquid carbohydrate composition with high shear to obtain a reconstituted composition containing between about 65 to about 80 weight percent solids. In a preferred embodiment, the process according to the invention comprises forming a reconstituted composition containing protein and carbohydrate at a total solids level greater than about 72 weight percent. In a more preferred embodiment, the solids content of the reconstituted composition is greater than about 66 weight percent, wherein less than about 6 weight of percent of the composition is fat. In a most preferred embodiment, the solids content of the reconstituted composition is greater than about 70 weight percent, wherein less than about 6 weight percent of the composition is fat.

In another aspect of the invention, the process comprises forming a reconstituted composition containing protein and carbohydrate at a total non-fat solids level greater than about 70 weight percent.

In another aspect of the invention, the proteinaceous composition is skim milk powder which is hydrated at a "hydration solids content" greater than about 50%, to achieve a composition having an overall solids content of greater than about 70% and a fat content less than about 6%. "Hydration solids content" is defined to mean the amount of solids to be hydrated with respect to that amount of solids plus the water available for hydration. For example, if a composition is reconstituted with milk powder, the "hydration solids content" is obtained looking only at the milk powder and the water used to hydrate it. The present invention obviates the need to remove water to arrive at a target solids content suitable for the above-mentioned end uses. The method of forming a reconstituted composition containing carbohydrate and protein at elevated total solids according to the invention provides greater process flexibility in the preparation of various confectionery.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The methods of the present invention provide mixtures of carbohydrate and protein which are prepared from at least one liquid carbohydrate composition and at least one powdered proteinaceous composition. The liquid carbohydrate composition is a combination of water and at least one carbohydrate and does not contain substantial amounts of protein. The carbohydrate of the liquid carbohydrate composition is not limited and may include sucrose, dextrose, lactose, corn syrup solids, high fructose corn syrup, maltodextrin, or other sweeteners. Preferably, the carbohydrate composition consists essentially of water and one or more carbohydrates. Preferably, the carbohydrate is sucrose, lactose, dextrose, or a combination thereof. The powdered proteinaceous composition is not particularly limited and may be, for example, skim or whole milk powder, milk protein concentrate, whey powder, caseinates, or a powder comprising soy, wheat, or egg proteins. Preferably, the proteinaceous composition according to the invention is a milk product. Most preferably, the proteinaceous composition is skim milk powder.

In a preferred embodiment, the high-solids composition reconstituted according to the present method contains sucrose, skim milk powder and water. In another preferred embodiment, the composition used with the invention con-